[notes from collaboration between Naturland, UNCW and Blue Ocean LLC on the development of an organic standard for Southern Flounder in a RAS]

The "main features" of an organic standard for flatfish or finfish would be (please revise):

- limitation of stocking densities (to approx. 1 layer of fish and/or a figure for kg/m2, e.g. 25)
    - 35 kg/m3 was proposed, actual market size of fish is needed to determine the 100% coverage requirement for the tank bottom using measurements of the fish
    - concerned that density limitation affects economics in a way that may make technology (RAS) not useful
    - concerned that this limitation to only 100% bottom coverage affects economics. Consideration should be given to the fact that flatfish such as southern flounder will often congregate, even when ample bottom space is available.
    - a measure of adequate water quality may be more meaningful than density or a combination of the two
    - no research has been done to determine if flounder in natural conditions to isolate themselves from others and need this space as a condition of health
    - consideration needs to be given to an objective physiological measurement of stress in fish as a basis for determining stress levels (e.g. cortisol levels as determined by blood samples)
    - We should look at research done by Institutional Animal Care and Use Committee (IACUC) guidelines for help in determining health guidelines for vertebrates {Shawn, fish's ability to perceive pain is not the same as in higher vertebrates. I have a reference that you need to look at}

- provision of substrate in the tanks (it must be discussed if this could happen in a first stage at only a percentage of the tanks)
    - Agree that only a percentage of tanks should be used to research this technique
    - Consider using bio-filer media and adjusting specific gravity to simulate substrate (Euryhaline nature of flounder allows salinity to be adjusted as required)
    - May want to design tank system specifically to include a provision for isolation (hiding places) that does not interfere with tank self cleaning properties

- stabilisation of temperature at the level that fish typically would encounter in nature, not pushing to the highest possible end
    - Temperature will be controlled within an acceptable range that is within the normal temperature range seen in the natural environment

- establishment of an concept for energy saving (we will have to elaborate this further, I also have to consult with colleagues)
    - Concept should be of a general nature such as having high efficiency components (pumps and motors)
    - incorporating some renewable energy systems such as geothermal and solar power to supplement power requirements
    - housings should have adequate insulating values

- provision of natural light and/or limitation of artificial illumination (this is an issue we haven't discussed during my stay, but it was brought up in various discussions and is important in other areas of organic animal husbandry)
    - provisions will be made for natural lighting (windows, skylights)
    - Artificial limitation should be no less than the average light period experienced during a typical summer day length

- establishment of a polyculture nutrient cycle (it must be discussed if this could happen in a first stage at only a percentage of the tanks)
    - Micro algae and shell fish, as an integrated culture can be used in brackish water and marine systems
    - Solids capture and reapplication can be used in inland fresh water systems as well as in brackish water and marine systems
    - This is an active area of research to determine the efficiency of each type of integrated culture and comparisons

- organic feed
    - Current research is being conducted at UNCW in this area
    - Reducing the percentage of fish meal in the feed is under research
    - Menhaden meal is an area of concern as it is an important input to the feed formulae
    - Alternative protein sources such as soybean meal will be investigated

- chemicals to be used must correspond to a positive list.

    - Only chemical on approved list will be used
    - Oxytetracycline is used as an antibiotic